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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,933	02/22/2002	Jianzhong Zhang	59864.00665	6502
32294	7590	05/15/2006		
SQUIRE, SANDERS & DEMPSEY L.L.P. 14TH FLOOR 8000 TOWERS CRESCENT TYSONS CORNER, VA 22182			EXAMINER CORRIELUS, JEAN B	
			ART UNIT 2611	PAPER NUMBER

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/080,933

Applicant(s)

ZHANG ET AL.

Examiner

Jean B. Corrielus

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 21-42 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-42 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Specification***

1. The objection to the specification has been withdrawn.

### ***Drawings***

2. The drawing fig. 2, filed on 3/28/06 has been disapproved because the drawing fails to correct the informalities noted in the last office action.

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference characters "88 " and "56" have both been used to designate a filter see fig. 3 and specification.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "72" has been used to designate both a receiving chain and a joint optimizer see figs. 2 and fig. 3 and specification.

The quality of the drawing filed on 02/22/02 is poor and needs to be resubmitted. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

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informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

4. In view of the cancellation of claims 1-20, the objection to claims 5-10 and 14-16 has been withdrawn.

5. Claims 29, 36, 39-42 are objected to because of the following informalities: claim 29 "." Should be inserted. Claim 36 depends on claim 32 which is a method claim. However, the body of claim 36 is directed to apparatus type limitations rather than method type limitations. Claim 39, last line "element" should be replaced by "means" for consistency. Claim 39 means should succeed "prefilter" and " estimator" so as to be consistent with the preamble. The same comment applies to any other comment introduced in claims 40-42, respectively. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

6. In view of the cancellation of claims 1-20, the 112 rejection of claims 17-20 has been withdrawn.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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8. Claims 29, 36, and 38-41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

claim 29, line 1, "the feed forward filter" lacks of proper antecedent basis.

Claim 36, line 1, "each of the plurality of receiving chain" lacks of proper antecedent basis.

Regarding claim 38, the word "means" is preceded by the word(s) "signal filter" "signal estimator", "signal optimizer" "interference cancellation", respectively in an attempt to use a "means" clause to recite a claim element as a means for performing a specified function. However, since no function is specified by the word(s) preceding "means," it is impossible to determine the equivalents of the element, as required by 35 U.S.C. 112, sixth paragraph. See *Ex parte Klumb*, 159 USPQ 694 (Bd. App. 1967).

The same comment applies to claim 39-42.

### ***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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10. Claims 21, 26, 30, 32, 34, 36 and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by Stenstrom et al US patent No.6,466,616.

As per claim 21, Stenstrom et al teaches a receiving station (fig. 4 and 5) comprising a signal filter 508 inherently in communication with a signal receiving antenna; a signal estimator 516 in communication with the signal filter 508; circuit 520 and 522 corresponding to the claimed signal optimizer in communication with the signal filter 508; circuit 524 and equalizer 518 considered as the claimed "decision feedback estimator" in communication with circuits 520 and 522 (signal optimizer).

As per claim 26, the signal filter 514 is located in the forward path of the receiving station hence it has to be a feedforward filter.

As per claim 30, the signal filter 508 and the signal estimator 516 is placed in the received chain of the receiving station see fig. 5.

As per claim 32, Stenstrom et al teaches a method comprising: receiving a data vector see for instance input of memory 512; forming optimized feed forward filter parameters from the data vector see col. 4, lines 57-67; forming optimized feedback filter parameters from the data vector see col. 4, lines 57-67; applying the optimized feed forward filter parameters to a feed forward filter to define filter characteristics of the feed forward filter see col. 4, lines 57-67 ; applying the optimized feedback filter parameters to a feedback filter to define filter characteristics of the feedback filter see col. 4, lines 57-67 ; and simultaneously performing interference cancellation and pre-filtering operations on the data vector through operation of the feed forward and feedback filters see col. 1, lines 39-55.

As per claim 34 the interference cancellation and prefiltering includes filtering the data vector in prefilter 514 and processing the data vector with a DFSE see col. 6, lines 45-50..

As per claim 36, the received chain comprises a receiving filter 506 inherently in communication with a signal antenna; a channel estimator 516 in communication with the receiving filter 506; the channel estimator 516 in communication with circuit 520 and 522 corresponding to the claimed signal optimizer configured to optimized feedforward and feedback filter parameters see col. 4, lines 57-67.

As per claim 38, Stenstrom et al teaches a receiving station (fig. 4 and 5) comprising a signal filter means 508 inherently in communication with a signal receiving antenna; a signal estimator means 516 in communication with the signal filter means 508; means 520 and 522 corresponding to the claimed signal optimizer means in communication with the signal filter means 508; means 524 518 considered as the claimed "interference cancellation means" in communication with means 520 and 522 (signal optimizer means).

### ***Claim Rejections - 35 USC § 103***

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 22-25, 28-29, 33, 39-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stenstrom et al US patent No.6,466,616 in view of Zangi et al US patent No. 6,775,322 et al.

As per claim 22, as applied to claim 21 above, Stenstrom et al discloses every feature of the claimed invention. In addition it further teaches a prefilter 514 and feedback filter and MLSE estimator see col. 5, lines 52-61. However it fails to specifically teach that the equalizer further includes a summing device in communication with the prefilter and the feedback filter in communication with the signal optimizer and the summing element and the MSLE estimator in communication with the summing element. As evidence by Zangi et al, it is well for an equalizer to include a summing device 106 in communication with the prefilter 102 and a feedback filter 104 in communication with circuit 120 (signal optimizer) and the summing element 106 and a MSLE estimator 108 in communication with the summing element 106. Given that fact, it would have been obvious to one skill in the art to configure the equalizer of Stenstrom as taught by Zangi et al so as to provide computational efficiency for computing filter coefficients see col. 2, lines 8-10.

As per claim 23 Zangi et al teaches that the output of the decision device (MLSE) 108 is in communication with the feedback filter 104 and the input of the decision device (MLSE) 108 is in communication with an output of the summing element 106. it would have been obvious to one skill in the art to configure the equalizer of Stenstrom in such a way as to set the output of the decision device (MLSE) is in communication with the feedback filter and the input of the decision device (MLSE) is



in communication with an output of the summing element and the motivation to do so would have been the same as provided above with respect to claim 22.

As per claim 24, Zangi et al teaches the feedback filter 104 comprises a first input in communication with circuit 120 (signal optimizer) and a second input in communication with an output of the MLSE 108. Given that fact, it would have been obvious to one skill in the art to modify Stenstrom et al to include a first input in communication with circuit (signal optimizer) and a second input in communication with an output of the MLSE in the feedback back filter as suggested by Zangi et al and the reason to do so would have been the same as provided above with respect to claim 22.

As per claim 25, Zangi et al further teaches the summing element 106 receives inputs from prefilter 102 and the feedback filter 104 and sends a summed output to the MLSE device 108. Given that fact, it would have been obvious to one skill in the art to modify Stenstrom et al to configure the summing element receives inputs from prefilter and the feedback filter and sends a summed output to the MLSE device as suggested by Zangi et al and the reason to do so would have been the same as provided above with respect to claim 22.

As per claim 28, Stenstrom further teaches that the feedback filter receives optimized signals from the signal optimizer that are used to define filter characteristics of the feedback filter see col. 4, lines 57-67 and col. 5, lines 62-67.

As per claim 29, interconnection of the feedforward filter, the feedback filter, the MLSE and the summing element cooperatively operate to permit inherently concurrent interference and prefilter operation to be performed. It would have been obvious to

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modify Stenstrom et al in such a way that concurrent interference and prefilter operations to be performed and the motivation to do so would have been the same as provided with respect to claim 22.

As per claim 33, Zangi et al further teaches the feedforward filter 102 filters the data vector and transmitting a feedforward output to a summing element 106; receiving an output of the summing element in a MLSE device 108 and generating an output of that is transmitted to an input of the feedback filter 104 and subsequent component and filtering the output received from the MSLE device in the feedback filter 104 and transmitting a filtered signal to the summing element 106. It would have been obvious to modify Stenstrom et al as taught by Zangi and the motivation to do so would have been the same as provided above with respect to claim 22.

As per claim 39 see claim 22.

As per claim 40 see claim 23.

As per claim 41 see claim 24.

As per claim 42 Zangi et al further teaches the summing element 106 receives inputs from prefilter 102 and the feedback filter 104 and sends a summed output to the MLSE device 108 and an output of the MLSE being an output from the receiving station. Given that fact, it would have been obvious to one skill in the art to modify Stenstrom et al to configure the summing element receives inputs from prefilter and the feedback filter and sends a summed output to the MLSE device as suggested by Zangi et al and the reason to do so would have been the same as provided above with respect to claim 22.

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13. Claims 27 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stenstrom et al US patent No.6,466,616 in view of Zangi et al US patent No. 6,775,322 et al. and further in view of Sexton et al US Patent Application S/N US2003/0081569.

As per claim 27, as applied to claim 25 above, Stenstrom et al and Zangi et al teaches every feature of the claimed invention but does not explicitly teach the further limitation of a deinterleaver in communication with an output of the MLSE estimator and depuncture in communication with a deinterleaver and a channel decoder in communication with the deinterleaver. Sexton et al teaches a deinterleaver 324 in communication with an output of the MLSE estimator(i.e. output of equalizer 322) and depuncture 326 in communication with a deinterleaver 324 and a channel decoder 328 in communication with the deinterleaver 324. it would have been obvious to one skill in the art to incorporate such a teaching in Stenstrom et al and Zangi et al in order to recover the originally transmitted signal.

As per claim 37, see claim 27.

14. Claims 31 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stenstrom et al US patent No.6,466,616 in view of Malkemes et al US Patent Application publication S/n US2002/0106040 A1.

As per claim 31, as applied to claim 30 above, Stenstrom et al teaches every feature of the claimed invention but does not explicitly teach that the receiving station comprises a plurality of receive chains that corresponds to a plurality of signal receiving

antennas configured to receive and transmit a plurality of signal vector to the plurality of receive chains. Malkemes et al teaches the receiving station (fig. 1) comprises a plurality of receive chains see fig. 1) that corresponds to a plurality of signal receiving antennas 102 configured to receive and transmit a plurality of signal vector to the plurality of receive chains. Given that fact, it would have been obvious to one skill in the art to incorporate such a teaching in Stenstrom et al in order to improve signal detection since the system would have been able to be configured to receive multiple copies so that existence of signal error can be easily determined.

### ***Response to Arguments***

15. Applicant's arguments with respect to claims 21-42 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any


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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jean B. Corrielus whose telephone number is 571-272-3020. The examiner can normally be reached on Maxi-Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jean B Corrielus  
Primary Examiner  
Art Unit 2611

5-11-06